

FILM TRAY FOR FABRICATING FLEXIBLE DISPLAY

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to and the benefit of Korean Patent Application No. 10-2005-80995, filed on Aug. 31, 2005, in the Korean Intellectual Property Office, the entire content of which is incorporated herein by reference

BACKGROUND

1. Field of the Invention

The present invention relates to a film tray, and more specifically, to a film tray for fabricating a flexible display.

2. Discussion of Related Art

Recently, technology of flexible displays such as an Organic Light Emitting Diode Display have been actively researched and developed. An Organic Light Emitting Diode (OLED) is used for an OLED Display. The OLED includes an anode electrode, an emitting light layer and a cathode electrode. The anode electrode supplies a hole for an emitting light layer and the cathode electrode supplies the electron for the emitting light layer. The holes supplied by the anode electrode and the electron supplied from cathode electrode generate light after being combined in the emitting light layer.

The formation process of a thin film as part of a flexible display has typically been carried out by a deposition method using a mask. However, sagging of the flexible substrate or film may occur in the thin film forming processes, preventing accurate sputtering and patterning. Also, since sputtering is performed within a vacuum chamber, it becomes difficult to transfer the flexible substrate or film to the chamber without any defects affecting the flexible substrate or film. Thus, there is a need for a film tray for fabricating a flexible display capable of preventing the flexible substrate or film from sagging at the time of manufacturing.

SUMMARY OF THE INVENTION

A film tray is provided for fabricating a flexible display. In one exemplary embodiment, the film tray includes a support plate and a support plate and at least one pair of clamps, each clamp of the at least one pair of clamps being located at a perimeter of the support plate to fix a flexible medium. A first clamp of the at least one pair of clamps is aligned with a second clamp of the least one pair of clamps. Each clamp includes an open-shut part adapted to open to receive the flexible medium and adapted to close to fix the flexible medium, an open-shut part adapted to open to receive the flexible medium and adapted to close to fix the flexible medium, and a support part adjacent to the open-shut part for providing a predetermined space to support the flexible medium at a predetermined level when the open-shut part is closed. An opening is formed in the central part of the support plate. The width of the support plate ranges from about 10 mm to about 50 mm. The support plate and clamps may be formed from a light metal like the aluminum or the synthetic resins such as a Carbon Fiber Reinforced Plastic. The support plate and clamps may be formed by the different metal bonding.

According to another exemplary embodiment of the present invention, a film tray is provided for flexible substrates attached to inflexible substrates. The film tray includes a support frame and a substrate support section formed within the perimeter of the support frame, the substrate support section providing a recess to support the flexible substrate

attached to an inflexible substrate. The substrate support section corresponds to the size of the flexible substrate attached to an inflexible substrate.

According to yet another exemplary embodiment of the present invention, a method of forming a thin film as part of a flexible medium is provided. The method includes providing a film tray including a support plate and at least one pair of clamps, each clamp of the at least one pair of clamps being located at a perimeter of the support plate to fix a flexible medium, a first clamp of the at least one pair of clamps being aligned with a second clamp of the least one pair of clamps. The flexible medium is inserted into an open open-shut part of each clamp of the at least one pair of clamps and the open-shut part of each clamp of the least one pair of clamps is closed to fix the flexible medium. Finally, the thin film is deposited onto the flexible medium.

According to still another exemplary embodiment of the present invention, a method of forming an emission layer of an organic light emitting diode is provided. The method includes providing a film tray including a support plate and at least one pair of clamps, each clamp of the at least one pair of clamps being located at a perimeter of the support plate to fix a flexible medium, a first clamp of the at least one pair of clamps being aligned with a second clamp of the least one pair of clamps. A donor film is inserted into an open open-shut part of each clamp of the at least one pair of clamps, the donor film including a base substrate, a light to thermal conversion layer and a thermal image layer. The open-shut part of each clamp of the least one pair of clamps is closed to fix the donor film. The donor film is placed in contact with an upper section of a combination of an acceptor substrate, an anode electrode, a hole pouring layer and a hole transferring layer and the donor film is laser patterned through the support plate. Finally, the donor film is removed from the acceptor substrate such that the emission layer is formed only in the portion of the acceptor substrate contacted by a laser.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view of a film tray for fabricating a flexible display according to one embodiment of the present invention.

FIG. 2 is a side cross-sectional view of the film tray of FIG. 1 through section line A-A'.

FIGS. 3A, 3B and 3C are cross-sectional views illustrating a method of fixing a flexible film to a film tray.

FIG. 4 is a top view of a film tray for fabricating a flexible display according to another embodiment of the present invention.

FIG. 5 is a top view of a film tray for fabricating a flexible display according to yet another embodiment of the present invention.

FIG. 6A is a partial cross-sectional view of the film tray of FIG. 5.

FIG. 6B is a partial perspective view of the film tray of FIG. 5.

FIGS. 7A and 7B show another embodiment of a film tray for fabricating a flexible display according to the present invention.

FIG. 8A is the cross-sectional view that shows a thin film deposited onto a flexible film using the film tray of FIG. 2.

FIG. 8B is a cross-sectional view showing fabrication of donor film using the film tray of FIG. 2.

FIGS. 9A, 9B, 9C and 9D are cross-sectional views showing the formation of an emission layer of an organic light emitting diode using the film tray of FIG. 8B.